

ABSTRACT

MICROVALVE DEVICES

15 This invention relates to an electrostatically operated, normally closed micromachined flow-through microvalve device.

20 The device comprises a stationary valve plate layer and a movable valve plate layer, the latter including an electrode plate such that it is deflectable by electrostatic forces under an applied voltage, and having a plurality of movable valve elements, each valve element moving with a degree of independence from the remaining valve elements. Application of a voltage results in deflection of the movable valve elements, the order of deflection depending on the relative magnitude of the electrostatic force experienced by the respective associated portion of the movable valve plate layer. This can be prescribed by the geometry of the device, and a preferred example provides a different separation between different portions of the movable valve plate layer and a further electrode plate in a device base plate layer.

25 The invention minimises the voltage required to open a normally closed valve in a high-pressure fluid environment, whilst ensuring relatively high flow rates through the microvalve once opened.

Figure. 2